

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF MASSACHUSETTS**

CAMTEK LTD.,

Plaintiff,

v.

RUDOLPH TECHNOLOGIES, INC.,

Defendant.

**Civil Action No.:**

**JURY TRIAL DEMANDED**

**COMPLAINT**

Plaintiff Camtek Ltd. (“Camtek”) by their attorneys, brings this civil action for patent infringement against Rudolph Technologies, Inc. (“Rudolph”), and alleges as follows:

**PARTIES**

1. Camtek is an Israeli corporation with its principal place of business in Migdal Haemek, Israel.

2. Upon information and belief, and according to documents Rudolph files with the SEC, Rudolph is incorporated in the State of Delaware and has its principal place of business and company Headquarters at 16 Jonspin Road, Wilmington, Massachusetts 01887. *See* Ex. A at 1.

**JURISDICTION AND VENUE**

3. Camtek brings this action seeking damages for Rudolph's infringement of U.S. Patent No. 6,192,289 (“the ‘289 Patent”) under the Patent Laws of the United States, Title 35 of the United States Code.

4. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5. This Court has personal jurisdiction over Rudolph because Rudolph is headquartered in this district and carries on substantial business in this district such as manufacturing, design, service and sales, such that it is reasonable for it to believe that it can be brought into Court in this District on any cause of action. Rudolph leases two facilities in Massachusetts: a seven thousand square foot building that it uses for “Engineering and Service” (Ex. A at 24) and a 43,000 square foot building that houses “Corporate, Engineering, Manufacturing and Service” facilities and personnel (*id.*).

6. On information and belief, over the last six years, Rudolph has offered for sale, sold, and/or delivered in this District, machines that practice the method claims of the ‘289 Patent to companies such as Skyworks and Analog Devices. These actions make it subject to personal jurisdiction for those and similar acts of infringement.

7. Upon information and belief, Rudolph’s NSX Series of machines, when used as intended and as Rudolph directs, infringe the method claims of the ‘289 Patent.

8. Venue is proper in this District under 28 U.S.C. §§ 1391 and 1400(b) as Rudolph is subject to personal jurisdiction in this District and it is Rudolph’s principal place of business.

### **THE PATENT**

9. On February 20, 2001, the ‘289 Patent, titled “Method and Apparatus for Analyzing Cuts,” was duly and lawfully issued by the United States Patent and Trademark Office (“USPTO”). The ‘289 Patent was assigned to Camtek on June 28, 2009. A copy of the ‘289 Patent is attached hereto as Exhibit B.

### **BACKGROUND**

10. Plaintiff Camtek is a provider of advanced automated solutions that enhance

production processes and yield in semiconductor fabrication. Camtek's research and development group is responsible for significant innovations in image acquisition and processing, which have made Camtek a technological leader in the field of visual inspection.

11. Camtek's inspection devices employ advanced technology to help control and improve manufacturing processes at microscopic levels in semiconductor manufacturing. The advanced technology includes Camtek's semiconductor inspection devices, which it sells to some of the world's leading semiconductor manufacturers.

12. In general terms, semiconductor devices are created through processes that involve laying down and/or removing multiple layers of material on a silicon wafer and creating integrated circuit patterns in regions on the wafer which are called "die." Typical production processes today result in a single circular wafer containing multiple semiconductor die.

13. At an appropriate time, a manufacturer may decide to cut the wafer into individual die in a process called dicing.

14. A saw is frequently used to perform the dicing.

15. The sawing process results in a cut between die with the cut having two edges known as "kerfs." These kerfs are not always perfectly smooth and can contain uneven "sawing chips" — indentations caused by the breaking of the wafer in response to the action of the saw blade.

16. If the sawing chips are too close to the functional areas of the die, they can render the circuits on the die inoperable.

17. Therefore, it is beneficial to inspect and characterize the kerfs and their chips after sawing to ensure that the cut is being done in a straight line and that none of the functional circuitry of the die has been damaged by chips created during the sawing process.

18. Monitoring and inspecting the kerf and its chips allows a manufacturer to optimize the yield of the process by identifying different types of dicing problems and adjusting the dicing process to eliminate those problems.

19. In the past, the process of determining whether sawing/dicing was successful was a subjective process carried out by human inspection. The process was slow, inefficient, and inconsistent.

20. On February 13, 1998, Michael Geffen, Abraham Gilon, and Herzliya Ben-Har filed a patent application in the United States for their invention of a new method and apparatus for analyzing and inspecting saw cuts of semi-conductor dies including the kerfs and the chips in the kerfs. The application was based on a priority application filed in Israel on April 13, 1997.

21. The invention, described in the '289 Patent, represented a breakthrough that allowed for faster, more accurate, and consistent and objective characterization of the kerfs and chips in an automated fashion to determine whether the sawing had resulted in chips which damaged vital circuitry on the die.

22. Camtek's invention advanced the field by providing an objective system and method for analyzing the quality of the sawing cuts and resultant die in a way that had not been done before.

23. Camtek disclosed the '289 Patent to Rudolph by no later than 2009 by identifying it in a chart with the inventor names and the title of the patent and also by providing a copy of the patent to Rudolph. In prior litigation between the parties, Rudolph made a motion to exclude Camtek witnesses from testifying about the '289 patent, demonstrating that it was aware of the '289 patent.

24. On information and belief, Rudolph maintains a program of identifying and

analyzing Camtek's patents of which it is aware. For example, Rudolph sought a reexamination of Camtek's United States patent number 6,934,019 that Camtek had identified to Rudolph at the same time that it identified the '289 patent.

### **FIRST CAUSE OF ACTION**

#### **(Infringement of U.S. Patent No. 6,192,289)**

25. Plaintiff incorporates paragraphs 1-24 as if restated herein.

26. Rudolph offers machines for the inspection of cuts and kerfs that result from sawing semiconductor wafers.

27. For example, on April 1, 2015, Rudolph announced on the newsroom of its website that it had secured a \$17 million order from a "major semiconductor foundry and a top outsourced semiconductor assembly and test (OSAT) facility" for "several NSX Series and Wafer Scanner inspection systems." Ex. C.

28. The press release states that Rudolph's NSX system "offers advanced detection algorithms that were able to control this new region of yield concern at the high throughput levels required by the customer." *Id.*

29. The "region of yield concern" related to "the inspection of die boundaries on identity sensor devices, specifically in the street/kerf region," which customers found "to be a novel challenge due to the varying test structures in the street." *Id.*

30. According to the press release, "[t]he NSX system's unique image processing technique was critical for the challenging kerf inspection application, where a traditional die-to-die comparison would not suffice." *Id.*

31. In a subsequent press release dated July 14, 2015, Rudolph touts its partnership with DISCO Corporation of Japan "to deliver leading-edge hardware and software solutions to

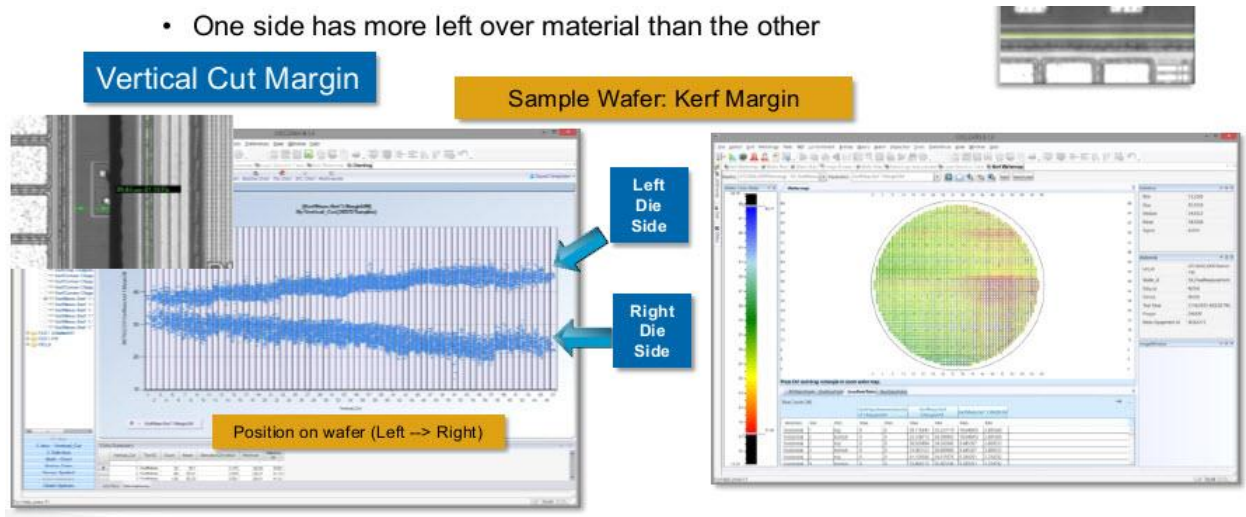
optimize the wafer saw unit processes,” which relied on “Rudolph’s NSX inspection system for post saw inspection.” Ex. D.

32. Rudolph’s NSX Series inspection systems, when operated in their normal mode of operation, perform the following steps which infringe at least method claims 5 and 6 of the ‘289 patent:

1) When used in normal operation, the NSX performs a method that identifies sawing chips by performing the following steps:

a) “identifying upper and lower kerfs of a viewed cut section”

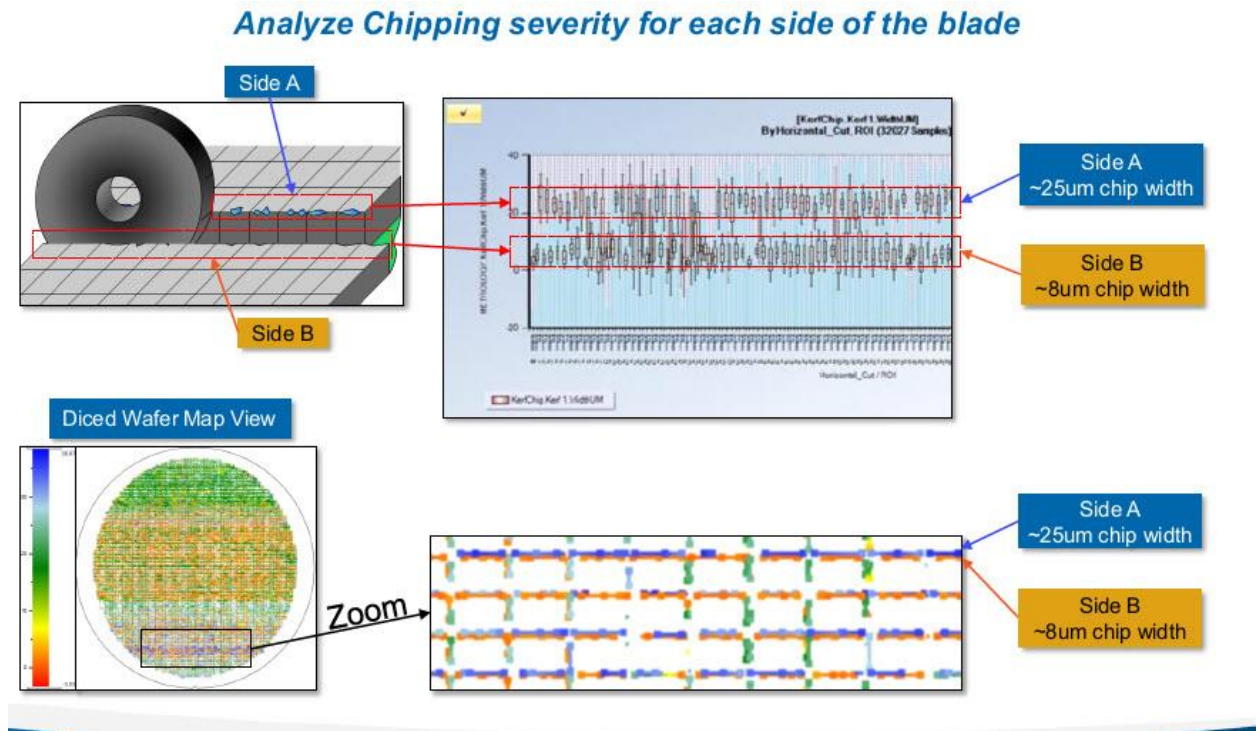
The slide below from Rudolph shows an upper and lower (termed left and right) kerfs being identified:



Ex. E at 10.

b) “identifying possible sawing chips along said upper and lower kerfs”

The slide below from Rudolph shows the Rudolph machine identifying possible sawing chips on the kerfs, for example, the blue triangles within the red rectangular boxes on the left hand figure:



Ex. E at 13.

c) “determining chip parameters for each of said possible sawing chips”

Slide 13 above shows identification of chips on the kerfs illustrated as blue triangles in the red boxes marked “Side A” and “Side B” and measurement of at least “chip width” which is a chip parameter.

d) “marking said possible sawing chips as sawing chips or as non-chips based on the values of said chip parameters”

Slide 13 above shows a “Diced Wafer Map View,” which marks where possible sawing chips are and, in the zoomed view, shows the width of the chips. Additionally, slide number 5 from Rudolph, reproduced below, states that the NSX system “[d]etects, classifies and measures chipping and delamination.”

## Kerf Inspection and Metrology

- Threshold-based inspection and metrology
- Detects, classifies and measures chipping and delamination
- Measures cut/scribe placement, width and margin, plus die separation

Ex. E at 5.

33. Rudolph's NSX Series devices, with such capabilities, when used as intended, infringe at least claims 5 and 6 of the '289 patent, either literally or under the doctrine of equivalents, and violate one or more sections of 35 U.S.C. § 271, such as § 271(a), (b) and (c). On information and belief, before shipping a machine (which can cost hundreds of thousands if not more than a million dollars) to a customer, Rudolph tests the functionality of the machine through operation and performs the steps listed above, including identifying upper and lower kerfs and identifying and marking possible sawing chips by measuring chip parameters such as width.

34. Rudolph's testing of the its machines before shipment to a customer infringes at



least claim 5 and 6 and constitutes direct infringement under 35 U.S.C. §271(a).

35. The RUDOLPH NSX Series of inspection systems has been sold in the United States since at least June 2011. On information and belief, Rudolph commercially manufactures, uses, offers for sale, or sells within the United States, or imports into the United States RUDOLPH NSX Series inspection systems. Rudolph's making, using, selling, and offering for sale of the NSX system to practice the methods identified above infringes at least claims 5 and 6 of the '289 Patent under 35 U.S.C. § 271(a).

36. Rudolph is aware of and has been informed about the existence of the '289 Patent since at least 2009. On information and belief, it is aware that the NSX system, in its normal mode of operation for inspecting kerfs and identifying possible sawing chips, practices the steps claimed in at least method claims 5 and 6 of the '289 Patent. By providing customers with the NSX machine and instructions to operate the machine in an intended manner, which it knows infringes claims 5 and 6 of the '289 patent, Rudolph has induced infringement under 35 U.S.C. § 271(b).

37. Rudolph has supplied the NSX machine to customers with software and hardware to perform Kerf and chip inspection, knowing that such hardware and software is not a staple article of commerce and knowing that when used in its intended manner does not have substantial uses which do not practice the steps claimed in claims 5 and 6 of the '289 Patent. Rudolph's act of supplying a material and substantial component of claims 5 and 6 of the '289 Patent, which is not a staple and for which there are not substantial non-infringing uses, constitutes contributory infringement under 35 U.S.C. § 271(c).

38. Rudolph was aware of the '289 Patent before it introduced the NSX system that could identify and classify kerfs and sawing chips as described above. Rudolph's introduction of

such a system along with instructions to customers to use it in an infringing way was done knowingly and intentionally without regard to Camtek's rights in the '289 patent. Upon information and belief, Rudolph has no excuse for its knowing and intentional acts of infringement of the '289 patent and therefore is guilty of willful infringement.

39. As a consequence of the infringing activities of Rudolph regarding the '289 Patent as complained of herein, Camtek has suffered monetary damages in an amount not yet determined.

40. On information and belief, there are no acceptable non-infringing alternatives to the patented '289 technology. As such, Camtek is entitled to lost profits for each infringing machine that Rudolph has manufactured or used or induced others to use. To the extent that Camtek is not entitled to lost profits, it is entitled to a reasonable royalty to account for the damage it suffered from the infringing machines.

41. Rudolph's infringement of the '289 patent has been willful and without excuse, entitling Camtek to recover up to three times its damages.

42. Unless enjoined, Rudolph will continue to infringe the '289 patent.

### **DEMAND FOR JURY TRIAL**

Camtek hereby demands a trial by jury on all issues so triable.

### **PRAYER FOR RELIEF**

**WHEREFORE**, Camtek prays for judgment as follows:

- A. Enter judgment in favor of Camtek on each of its claims;
- B. Enter judgment against Rudolph adjudging that the '289 patent is infringed;
- C. Award Camtek an amount adequate to compensate for Rudolph's infringement of

the Patents-in-Suit, including lost profits and/or a reasonable royalty under 35 U.S.C. § 284;

D. Award Camtek enhanced damages under 35 U.S.C. § 284;

E. Grant Camtek pre-judgment and post-judgment interest on the damages caused to it by reason of Rudolph's infringement of the Patents-in-Suit;

F. Declare that this is an "exceptional case" under 35 U.S.C. § 285, and award Camtek its attorneys' fees, costs, and expenses that it incurs prosecuting its claims;

G. Enter an injunction permanently enjoining Rudolph from infringing the '289 Patent; and

H. Enter judgment that Camtek be awarded such other and further relief as this Court deems just and proper.

Dated: June 16, 2017

Respectfully submitted,

/s/ Jennifer B. Furey

Jennifer B. Furey (BBO #: 634174)

([jfurey@goulstonstorrs.com](mailto:jfurey@goulstonstorrs.com))

Andrew T. O'Connor (BBO#: 664811)

([aconnor@goulstonstorrs.com](mailto:aconnor@goulstonstorrs.com))

**GOULSTON & STORRS P.C.**

400 Atlantic Ave.

Boston, MA 02110

Telephone: 617-482-1776

Claude Stern (*pro hac vice*)

([claudestern@quinnemanuel.com](mailto:claudestern@quinnemanuel.com))

**QUINN EMANUEL URQUHART &  
SULLIVAN, LLP**

555 Twin Dolphin Drive, 5<sup>th</sup> Floor

Redwood Shores, CA 94065

Telephone: 650-801-5000

Facsimile: 650-801-5100

David Bilsker (*pro hac vice*)

([davidbilsker@quinnemanuel.com](mailto:davidbilsker@quinnemanuel.com))

Felipe Corredor (*pro hac vice*)

([felipecorredor@quinnemanuel.com](mailto:felipecorredor@quinnemanuel.com))

**QUINN EMANUEL URQUHART &  
SULLIVAN, LLP**

50 California Street, 22<sup>nd</sup> Floor

San Francisco, CA 94111

Telephone: 415-875-6600

Facsimile: 415-875-6700

***Attorneys for Plaintiff Camtek Ltd.***